ENGINEERING EVALUATION
EAST BAY MUNICIPAL UTILITY DISTRICT (EBMUD); SITE 13712
APPLICATION 6534

BACKGROUND

The East Bay Municipal Utility District (EBMUD) has applied for an Authority to Construct two identical new, natural gas microturbines with exhaust heat recovery (S-18 and S-19). The microturbines will be installed at EBMUD's Adeline maintenance facility at 1100 Twenty First Street, Oakland, CA. The microturbines will be installed within 1000 feet of Bunche/Whitton School and Bunche Continuation High School, thus Waters Bill School Public Notice is triggered. The applicant has requested 24 hours/day, 365 days/year of operation for both microturbines. The generating capacity of the microturbines will provide less than 50% of the electricity used for the building. The heat recovered from the microturbines will be used to replace existing hot water boilers and to produce chilled water for the air conditioning system.

The sources within this application are:

S-18 Capstone 60 Microturbine with Heat Recovery, 60 kW Maximum Output: Natural-Gas Fired, Maximum Firing Rate: 0.811 MM Btu/hr.
S-19 Capstone 60 Microturbine with Heat Recovery, 60 kW Maximum Output: Natural-Gas Fired, Maximum Firing Rate: 0.811 MM Btu/hr.

S-18 and S-19 are new sources as defined in Regulation 2, Rule 1, Section 232. The microturbines have a power rating of less than 0.3 MW (300 kW). As such, sources 2 through 11 are exempt from Regulation 9, Rule 9 (Nitrogen Oxides And Carbon Monoxide from Stationary Gas Turbines) as stipulated in Section 9-9-110 (Exemption, Small Turbines).

EMISSIONS

Basis:
Daily and annual emissions from S-18 and S-19, assuming a requested 8760 hrs/yr of total annual operation, a maximum of 24 hrs/day, and 0.811 MMBtu/hr at full load, will be calculated using the emissions factors as furnished by the manufacturer for NO_x, CO, and VOC. Values for PM_{10} and SO_2 were taken from AP-42, Chapter 3: Stationary Internal Combustion Sources, Section 3.1: Stationary Gas Turbines, Table 3.1-2a: Emission Factors For Criteria Pollutants and Greenhouse Gases From Stationary Gas Turbines.

Fuel Consumption: 811,000 Btu/hr @ Full Load

Formulas for Calculating Emissions of NO_x, CO, and VOC:

(24 hours/day) (60 kW) (X.XX lb/kW-hr)	= X.XX lbs/day
(24 hours/day) (365 days/yr) (60 kW) (X.XX lb/kW-hr)	= X.XX lbs/yr
(X.XX lbs/yr) (1 ton/ 2000 lbs)	= X.XX tons/yr

Formulas for Calculating Emissions of PM_{10} and SO_2:

(24 hours/day) (0.811 MMBtu/hr) (X.XX lbs/MMBtu)	= X.XX lbs/day
(24 hours/day) (365 days/yr) (0.811 MMBtu/hr) (X.XX lb/MMBtu)	= X.XX lbs/yr
(X.XX lbs/yr) (1 ton/ 2000 lbs)	= X.XX tons/yr

TABLE 1A: NO_x, CO, and POC Emissions

Pollutant:	Emission Factor (lb/kW-hr) :	Emissions (per Microturbine)			Emissions (for both Microturbines)		
		Maximum Daily usage (lbs/day)	Maximum Annual Usage (lbs/year)	Maximum Annual Usage (tons/year)	Maximum Daily usage (lbs/day)	Maximum Annual Usage (lbs/year)	Maximum Annual Usage (tons/year)
NO_x	**4.91E-04**	0.71	258.07	0.13	1.42	516.14	0.2581
CO	**2.99E-04**	0.43	157.15	0.08	0.86	314.3	0.1572
POC	**1.71E-04**	0.25	89.88	0.04	0.5	179.76	0.0899

TABLE 1B: PM_{10} and SO_2 Emissions

Pollutant:	Emission Factor (lb/MMBtu) :	Emissions (per Microturbine)			Emissions (for both Microturbines)		
		Maximum Daily usage (lbs/day)	Maximum Annual Usage (lbs/year)	Maximum Annual Usage (tons/year)	Maximum Daily usage (lbs/day)	Maximum Annual Usage (lbs/year)	Maximum Annual Usage (tons/year)
PM_{10}	**6.60E-03**	0.13	46.89	0.02	0.26	93.78	0.0469
SO_2	**3.40E-03**	0.07	24.15	0.01	0.14	48.3	0.0242

TOXIC RISK SCREEN ANALYSIS

TABLE 2: Toxic Air Contaminants (TACs)

CAS Number:	Pollutant:	Emission Factor (lbs/MMscf):	Calculated Annual Emissions (lbs/year):	BAAQMD Trigger Level (lbs/year):	Exceeds Trigger? (Yes/No)
106-99-0	1,3-Butadiene	1.33E-04	1.89E-03	1.10E+00	NO
75-07-0	Acetaldehyde	5.11E-01	7.26E+00	7.20E+01	NO
107-02-8	**Acrolein**	**6.93E-02**	9.85E-01	**3.90E+00**	NO
71-43-2	**Benzene**	**9.90E-02**	1.41E+00	**6.70E+00**	NO
50-00-0	Formaldehyde	6.52E-09	9.26E-08	3.30E+01	NO
110-54-3	Hexane	3.82E-01	5.43E+00	8.30E+04	NO
91-20-3	Naphthalene	7.88E-03	1.12E-01	2.70E+02	NO
*	**PAHs**	**7.78E-04**	1.11E-02	**4.40E-02**	NO
56-55-3	Benzo(a)anthracene	1.34E-04	1.90E-03	4.40E-02	NO
50-32-8	Benzo(a)pyrene	9.16E-05	1.30E-03	4.40E-02	NO
205-99-2	Benzo(b)fluoranthene	6.72E-05	9.55E-04	4.40E-02	NO
207-08-9	Benzo(k)fluoranthene	6.72E-05	9.55E-04	4.40E-02	NO
218-01-9	Chrysene	1.50E-04	2.13E-03	4.40E-02	NO
53-70-3	Dibenz(a,h)anthracene	1.34E-04	1.90E-03	4.40E-02	NO

TABLE 2: Toxic Air Contaminants (TACs)					
CAS Number:	**Pollutant:**	**Emission Factor (lbs/MMscf):**	**Calculated Annual Emissions (lbs/year):**	**BAAQMD Trigger Level (lbs/year):**	**Exceeds Trigger? (Yes/No)**
193-39-5	Indenol(1,2,3-cd)pyrene	1.34E-04	1.90E-03	4.40E-02	NO
75-56-9	Propylene Oxide	5.87E-02	8.34E-01	5.20E+01	NO
108-88-3	Toluene	1.68E-01	2.39E+00	3.90E+04	NO
133-02-07	Xylene	6.26E-02	8.89E-01	5.80E+04	NO

Notes:

1. Emission Factors for all TACs, except for Formaldehyde, from CATEF II - Turbine firing Natural Gas.

2. Source specific emission factor for formaldehyde provided through in-house test on microturbine.

3. Speciated PAH emission factors from CATEF II. Speciated PAHs chosen to conform to list of 25 selected PAHs as listed by Brian Bateman, Manager of Toxics Division, through e-mail sent to Permit Bulletin Board on April 25, 2002.

4. Conversion factor of 1000 Btu/scf for natural gas was used in calculations.

5. Calculations include emissions from both microturbines and a firing rate of 0.811 MMBtu/hr running for 8760 hours per year (24 hours/day, 365 days/year).

A Toxic Risk Screen Analysis was not required for sources 18 and 19 since emissions of all toxic air contaminants do not exceed the District levels as defined in Regulation 2, Rule 1, Table 316.

CUMULATIVE INCREASE

This is a new plant with no existing sources so there are no current cumulative increase emissions.

NO_x: 0.0 tons/yr (current) +0.2581 tons/yr (proposed) = 0.2581 tons/yr (new total)
CO: 0.0 tons/yr (current) +0.1572 tons/yr (proposed) = 0.1572 tons/yr (new total)
SO_x: 0.0 tons/yr (current) +0.0899 tons/yr (proposed) = 0.0899 tons/yr (new total)
PM_{10}: 0.0 tons/yr (current) +0.0469tons/yr (proposed) = 0.0469 tons/yr (new total)
POC: 0.0 tons/yr (current) +0.0242 tons/yr (proposed) = 0.0242 tons/yr (new total)

BACT

S-18 and S-19 do not trigger Best Available Control Technology since emissions from all regulated criteria pollutants are below the trigger level of 10 lbs/day as outlined in Section 2-2-301.

OFFSETS

Offsets are not required since plant 13712 currently has no reported emissions data and this application does not emit more than 15 tons of precursor organic compounds and/or nitrogen oxides or more than 1 ton of PM_{10} and/or sulfur dioxide that trigger offsets per Rule 2-2.

STATEMENT OF COMPLIANCE

S-18 and S-19 are rated at less than 0.3 MW. As stipulated in Regulation 9-9-110, S-18 and S-19 are therefore exempt from requirements of Regulation 9, Rule. S-18 and S-19 are subject to the SO_2 limitations of Regulation 9-1-301 (ground level concentration) and 9-8-302 (General Emission Limitation). Compliance with Regulation 9-1-301 and 9-1-302 is likely since S-18 and S-19 will be fired exclusively with utility-grade natural gas with a maximum sulfur content of 1 gr/100 scf.

This permit application is categorically exempt from CEQA under regulation 2-1-312.8. In making the determination that this application is categorically exempt: 1) a review of the CEQA-Related Information submitted by the applicant has been conducted indicating that there is no potential for a significant adverse environmental impact from the project; 2) a formal health risk assessment was not required; and 3) no unusual circumstances or cumulative impacts from successive projects of the same type in the same place over time were determined to result in significant adverse environmental impacts. The District has received a complete Appendix H of the State CEQA Guidelines.

This project is within 1,000 ft of the nearest public school and is therefore subject to the public notification requirements of Regulation 2-1-412.

A toxic risk screening analysis was not required.

BACT, PSD, NSPS, and NESHAPS are not triggered.

PERMIT CONDITIONS

APPLICATION 6534; EAST BAY MUNICIPAL UTILITY DISTRICT (EBMUD); PLANT 13712;
CONDITIONS FOR S-18 AND S-19:

(PC 20235)

1. The owner/operator shall exclusively fire each source on utility-grade Natural Gas with a maximum sulfur content of 1 gr/100 scf. The owner/operator shall ensure that the total fuel consumed by each source, does not exceed 71,044 therms[1] of Natural Gas during any consecutive 12-month period.
   (Basis: Cumulative Increase)

2. The owner/operator shall ensure emissions of Nitrogen Oxides (NOx) from each source will not exceed 0.223 g/kW-hr (9 ppmvd @ 15% O_2).

   (Basis: Cumulative Increase)

3. The owner/operator shall ensure the total mass emissions of NOx from each source will not exceed 258.7 lbs/year (0.13 tons per year).

   (Basis: Cumulative Increase)

4. The owner/operator shall ensure emissions of Carbon Monoxide (CO) from each source will not exceed 0.136 g/kW-hr (9 ppmvd @ 15% O_2).

[1] 71,044 therms = (811,000 Btu/hr) * (24 hours/day)*(365 days/year) *(1 therm/ 100,000 Btu)

(Basis: Cumulative Increase)

5. The owner/operator shall ensure the total mass emissions of CO from each source will not exceed 157.15 lbs/year (0.08 tons per year).

   (Basis: Cumulative Increase)

6. The owner/operator shall ensure emissions of Precursor Organic Compounds (POC) from each source will not exceed 0.078 g/kW-hr (9 ppmvd @ 15% O_2).

   (Basis: Cumulative Increase)

7. The owner/operator shall ensure the total mass emissions of POC from each source will not exceed 88.98 lbs/year (0.04 tons per year).

   (Basis: Cumulative Increase)

8. To determine compliance with Condition 1, the owner/operator shall equip each source with a non-resettable totalizing meter that measures the fuel usage. The owner/operator shall maintain all records of engine operation and fuel usage for at least 24 months, and shall make the records available for inspection by BAAQMD staff upon request. These record-keeping requirements shall not replace the record-keeping requirements contained in any applicable District regulations. The monthly log of operations shall include the following:
   a. Fuel Consumption in million SCF and/or therms

   (Basis: Cumulative Increase)

RECOMMENDATION

Issue the EAST BAY MUNICIPAL UTILITY DISTRICT (EBMUD) a conditional Authority to Construct for the following equipment:

S-18 Capstone 60 Microturbine with Heat Recovery, 60 kW Maximum Output: Natural-Gas Fired, Maximum Firing Rate: 0.811 MM Btu/hr.
S-19 Capstone 60 Microturbine with Heat Recovery, 60 kW Maximum Output: Natural-Gas Fired, Maximum Firing Rate: 0.811 MM Btu/hr.

BY: _____ _____
Nicholas C. Maiden **Date**
Temporary Air Quality Permit Technician

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